ENERGY DATA COLLECTION AND METERING IN TEXAS STATE AGENCIES

TIMOTHY J. GRIGG, E.I.T.
Program Manager
Governor's Energy Management Center
Austin, Texas

ABSTRACT

The State of Texas is probably the largest utility consumer in Texas. Each year, more than 130 separate agencies purchase some form of energy (electricity, natural gas, steam, and hot or chilled water). Annual energy bills for state agencies range from a few hundred dollars to over $20 million, and the total for all agencies is currently near $200 million. To keep pace with the trend of energy consumption in state facilities, the Governor's Energy Management Center (GEMC) requests agencies to mail in energy cost and consumption reports semiannually. This method of energy consumption reporting is proving inadequate, so the GEMC is investigating the use of computerized reporting to obtain this data from state facilities. Similarly, as energy retrofit projects at state facilities become funded, remote monitoring devices to track and document actual energy savings are being considered. A pilot project is underway in conjunction with a cogeneration feasibility study at Austin State Hospital in Austin, Texas. This paper will discuss past, present and future methods of energy data collection for state agencies, and the proposed method of monitoring retrofit projects.

INTRODUCTION

When assessing energy management, the most important information is cost and consumption data for consumed energy, both historical and current. Review of this information is the first step in an energy audit. Successful energy management programs include a system to regularly review and account for energy consumption. The measure of success for energy management is almost always shown through energy consumption trends. So, just as the "bottom line" in business is the amount of profit generated, the "bottom line" in energy management is the amount of energy consumed and its cost.

The State of Texas owns more than 11,700 buildings, with more than 145 million gross square feet of building space (1). As shown in Figure 1, annual energy costs for the state have increased from $34 million in 1973 to a high of almost $254 million in 1984 (2). The state's energy costs are currently running around $200 million annually. This drop since 1984 is attributable mainly to the decrease in the cost of fossil fuels, due to the world petroleum surplus. Because of the large volume of energy purchased by the state, it is very important that the state maintain records on its cost and consumption.

EARLY EFFORTS

1973 TO 1976

Like the rest of the nation, the State of Texas began its energy conservation efforts in 1973 to counteract the rising cost of energy. That year, to monitor the progress of the state's energy conservation effort, Governor Dolph Briscoe instructed state agencies and universities to initiate energy conservation programs and to report their energy consumption to the Governor's Energy Advisory Council (GEAC). Beginning in 1974, the Texas Energy Report, published monthly by GEAC, began reporting energy consumption for the fifty-eight largest energy consumers among state agencies and universities. The report compared consumption for the most recent calendar year quarter with the corresponding quarter for the 1973 base year. Publication of these reports continued until July 1977, when the Texas Energy Report was discontinued. The last report covered the fourth quarter of calendar year 1976. The author does not know if energy data were collected after 1976.

These early energy consumption reports by the agencies and universities showed only gross energy consumption. No figures on occupied square footage were reported. While this consumption information was useful, it alone could not be used to show changes in efficiency of energy use by the state. Recognizing this, GEAC in 1976 collected the additional information, namely occupied square footage, needed to show changes in consumption efficiency. In January 1977, GEAC prepared a report, State Government Energy Consumption 1973 to 1975, which for the first time presented state energy consumption figures based on an Energy Utilization Index, stated in terms of BTU's per square foot.

1984 TO 1987

A new initiative was begun in 1984 to again collect energy cost and consumption data from the top energy consuming state agencies. This task was undertaken by what is now the Governor's Energy Management Center (GEMC) (then, the Energy Efficiency Division of the Public Utility Commission). Using expenditure reports from the Comptroller's Office, the top sixty energy consuming agencies, representing over ninety percent of the state's total energy expenditures for fiscal year 1987, were identified. Budget officers at these sixty agencies were contacted and asked to voluntarily submit monthly energy data and agency square footage for fiscal years 1981-1983. Thereafter, they were again contacted semiannually to submit these monthly data for the previous six months and to update their square footage. The data were collected on blank forms (Figure 2) sent to each agency contact and returned to the GEMC.

Proceedings of the Fifth Symposium on Improving Building Systems in Hot and Humid Climates, Houston, TX, September 12-14, 1988

Figure 1. Annual Energy Expenditures

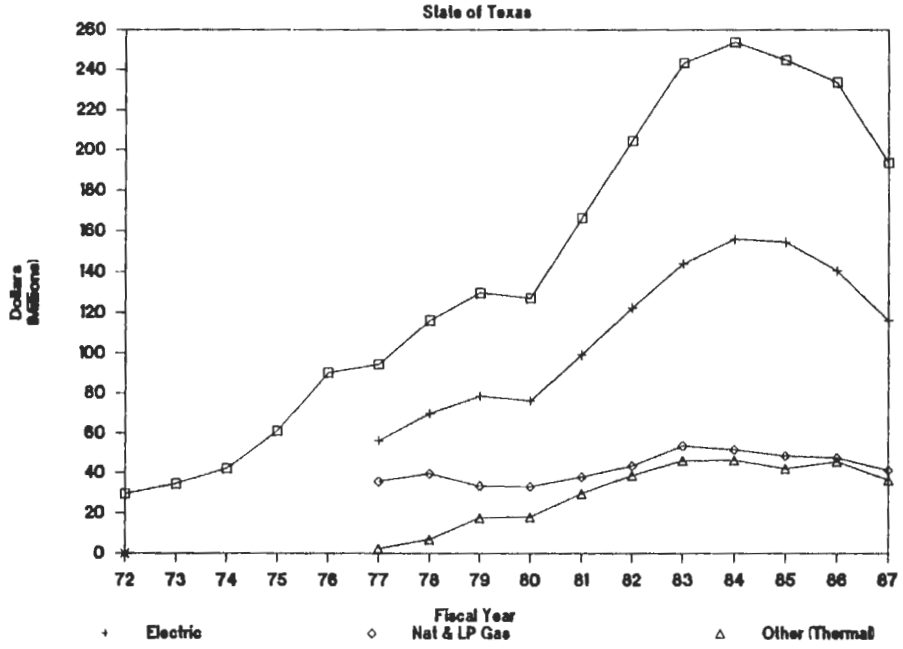

FIGURE 2

STATE AGENCY/INSTITUTION ENERGY CONSUMPTION REPORT

Second Half of Fiscal Year 1987

1. Agency/Institution Name: _____
2. Agency Address: _____
3. City/Zip: _____
4. Agency Energy Contact: _____
5. Form Prepared By: _____
6. Total Conditioned Square Feet: _____

ENERGY USE AND COST DATA

	Purchased Energy						Purchased Thermal				
	Electricity		Natural Gas		Other		Steam-Hot H_2O		Chilled H_2O		
Month	KWH	Cost	MCF	Cost	Unit	Cost	Lbs	Cost	Ton/Hrs	Cost	Total Energy Costs
March 87											
April 87											
May 87											
June 87											
July 87											
August 87											
TOTAL											

**For inquiry, contact Tim Grigg at (512) 463-1891 or Dr. Dennis O'Neal at (409) 845-6039.

The primary interest at that point was actual state expenditures for energy. All universities and a few agencies have square footage devoted to "auxiliary enterprises," such as dormitories, cafeterias, bookstores, museums, etc. Utilities for auxiliary enterprise space typically are funded through fees or other generated income. To accurately reflect actual state expenditures, the agencies were asked to back out the square footage devoted to auxiliary enterprises and the cost of energy for these areas.

The data collected during this period were computerized and used to indicate consumption trends for each agency. Since the effort was voluntary, data for some agencies are incomplete. Efforts have been made to make the data as complete as possible, retroactively through 1981. When available, agency data for 1981 are used as the base year. Otherwise, 1984 is the base year. Agencies are not compared against each other, due to differences in operations, locations, and functions. Instead, agency performance is judged by the consumption trend.

CURRENT COLLECTION EFFORTS

The State Agencies Department of GEMC is responsible for providing energy management assistance to Texas state agencies. Along with this responsibility, the GEMC is statutorily required to obtain semiannually from each state agency information relating to the cost of heating and cooling buildings owned by the state, effective fiscal year 1988 (5). This required collection is basically a continuation of the previous voluntary effort. However, instead of only sixty agencies, data now must be collected from all state agencies that pay for energy. For fiscal year 1987, expenditure reports from the Comptroller's Office show 133 agencies and universities paying some form of energy utility.

The data will be collected, as before, on forms sent to each agency for completion and returned to the GEMC. Forms will request monthly consumption and cost figures for each facility. Auxiliary enterprise space no longer will be excluded. Instead, agencies will be asked to provide an estimate of square footage occupied by auxiliary enterprises. When returned by the agencies, the data will be computerized, reviewed for possible errors, and corrected as required. The computerized data then will be used to determine monthly consumption trends. The intention is to send each agency a summarized report of its consumption patterns.

In addition to the required semiannual collection, the Governor has requested quarterly reports on energy consumption and costs for the top 25 energy consuming state agencies and universities. These 25 agencies represent over fifty percent of the state's total energy costs. The information requested on a quarterly basis will be the same as that collected semiannually.

FUTURE COLLECTION GOALS

The GEMC currently is evaluating methods of obtaining energy data to meet future needs. Items which are being considered include: ability to obtain more accurate and up-to-date information from facilities; faster GEMC response to developing needs; and reduced man-hour requirements for both the agencies and the GEMC.

SHORT-TERM

For the short-term, the need will be to monitor and track energy use for energy cost reduction retrofits and demonstration projects at state facilities. The Mechanical Engineering Department at Texas A&M University is under contract to assist the GEMC with evaluating potential monitoring systems to accomplish this task. To date, vendor literature has been reviewed; but no particular system has been selected, nor have hardware demonstrations or tests been conducted.

Austin State Hospital. Negotiations between the GEMC and the Texas Department of Mental Health and Mental Retardation are in process regarding the installation of a cogeneration demonstration project at the Austin State Hospital. Funding for this project would be obtained from federal grants administered by the GEMC. If negotiations are successful, the initial phase of this project would be a feasibility study of the existing central plant and potential cogeneration configurations. The feasibility study would require installation of metering devices on major equipment in the central plant to establish efficiencies of existing equipment and operating load profiles for the hospital. In addition to using the metering installation to gather data for the study, the GEMC also plans to use this as a pilot project for remote monitoring and data acquisition. By so doing, we hope to gain valuable insight into potential problems which can be avoided when the system is expanded to statewide monitoring applications.

LONG-TERM

The long-term goal of the GEMC for energy data collection from state agencies is to institutionalize the practice and make it a permanent function within state government. One way to accomplish this is to extend the application of remote monitoring of retrofits and demonstration projects to include monitoring of incoming energy utilities at state facilities. While this at first sounds like the ideal approach, significant problems exist. First, metering equipment will require calibration checks and periodic maintenance. This is not a major problem for a single site; but when extended to facilities across the state it, quickly becomes an expensive proposition. In addition, first costs would be tremendous. This approach is also limited to consumption only. Utility cost data still must be reported by the agencies.

An alternative approach favored by the GEMC is to provide standard utility tracking software to each state agency. The GEMC hopes to provide a package that will be a useful energy management tool to help each agency with its particular needs. With such a package, agencies will regularly enter the cost and consumption data into the software. It is then a simple matter of copying the data to disk for mailing or transmitting via modem to the GEMC. Numerous energy management software packages are available. The GEMC has begun evaluation, in anticipation of selecting one to distribute to all agencies.

The time frame for meeting both short-term and long-term needs is basically the same. The difference is that the short-term monitoring will be used for only a few years until the retrofits are completed, while the goal of the long-term data collection effort is to establish a permanent system.

SUMMARY

Until recently, collection of energy cost and consumption data from all state agencies and universities was not a requirement. Previous efforts were limited to the largest consumers. Data collection efforts in the 1970's were incomplete, initially collecting only gross energy consumption figures. The most recent effort from 1984 to 1987 was voluntary for the agencies and contains incomplete data. The current required collection of the Governor's Energy Management Center will collect energy data from all agencies and universities paying for utilities. It will be a manual collection effort. Forms will be sent to each agency for completion and mailed back to the GEMC. Data will then be entered onto a personal computer for use. In the future, the GEMC hopes to automate the process, probably by providing agencies with energy management software on which consumption data will be entered. Data computerized by the agencies can then be sent to the GEMC on magnetic medium or sent to the GEMC via a modem. In addition, the GEMC hopes to employ remote monitoring devices to track and document energy consumption and cost reductions at facility retrofits statewide.

REFERENCES

1. State Real Property Inventory Report, Texas General Land Office, Austin, Texas, March 3, 1988.

2. State of Texas Annual Financial Report, Texas Comptroller of Public Accounts, Austin, Texas, 1973-1987.

3. Texas Energy Report, Governor's Energy Advisory Council, Austin, Texas, April 1976-July 1977.

4. State Government Energy Consumption, 1973 to 1975, Governor's Energy Advisory Council, Austin, Texas, January 1977, unpublished.

5. Senate Bill 33, 70th Texas Legislature, Second Called Session, 1987.